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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/695,775	10/30/2003	Cengiz S. Ozkan	034044.025	6901

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EXAMINER

HARRISON, MONICA D

ART UNIT PAPER NUMBER

2813

DATE MAILED: 04/15/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

AK

Office Action Summary

Application No.

10/695,775

Applicant(s)

OZKAN ET AL.

Examiner

Monica D. Harrison

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 October 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-17 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-4, 7-9, 15 and 16 are rejected under 35 U.S.C. 102(e) as being anticipated by Lieber et al (6,743,408 B2).

1. Regarding claim 1, Lieber et al discloses a heterojunction comprising at least one carbon nanotube and at least one nanostructure connected, immobilized, attached, or affixed thereto (column 12, lines 25-49; Figures 8A-8D).

2. Regarding claim 2, Lieber et al discloses wherein the carbon nanotube is a single walled carbon nanotube having a length of about 20 nm to about 2000 nm (Figure 15A).

3. Regarding claim 3, Lieber et al discloses wherein the carbon nanotube is a multi-walled nanotube having a length of about 40 nm to about 4000 nm (column 11, lines 21-30).

4. Regarding claim 4, Lieber et al discloses wherein the nanostructure is a quantum dot or a quantum cluster comprising a plurality of quantum dots (column 13, lines 9-22).

5. Regarding claim 7, Lieber et al discloses one carbon nanotube having one nanostructure connected, immobilized, attached, or affixed to one end of the carbon nanotube (Figures 8A-8D).

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6. Regarding claim 8, Lieber et al discloses one carbon nanotube having two nanostructures connected, immobilized, attached, or affixed to each end of the carbon nanotube (column 3, lines 34-37; *MWNT*).

7. Regarding claim 9, Lieber et al discloses at least two carbon nanotubes having a nanostructures connected, immobilized, attached, or affixed to one end of each of the carbon nanotubes (column 1, lines 17-57; Figure 3C; *nanotubes are nanostructures*).

8. Regarding claim 15, Lieber et al discloses a nanodevice which comprises the heterojunction of claim 1 (Figures 9A-9C; column 12, lines 50-67 thru column 13, lines 1-8).

9. Regarding claim 16, Lieber et al discloses at least one nanostructure selected from the group consisting of photoactive molecules, photonic molecules, inorganic ions, inorganic molecules, magnetic ions, magnetic molecules, metallic ions, metallic molecules, metallic colloids, metal oxide molecules, polymers, aptamers, haptens, radioactive molecules, fluorophores, chromophores, chemiluminescent molecules, nanowires, nanofibers, quantum dots, nucleotides, nucleic acid molecules, polynucleotides, amino acids, peptides, polypeptides, proteins, and peptide nucleic acids (column 6, lines 10-50; *metallic colloid*).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 5, 6, 10, 13 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lieber et al (6,743,408 B2) in view of Wong et al (6,875,274 B2).

10. Lieber et al discloses all above claimed subject matter except the quantum dot is ZnS capped CdSe, CdSe or TiO₂ (claim 5), CdSe core and ZnS shell (claim 6), oxidizing the ends of the carbon nanotube, placing at least one amine group on the nanostructure, and coupling at least one end of the carbon nanotube with the nanostructure (claim 10), 2-aminoethanethiolhydrochloride (claim 13) and wherein coupling the end of the carbon nanotube with the nanostructure comprises adding 1-ethyl-3-(3-dimethylaminopropyl) carbodiimide HCL in the presence of N-hydroxysuccinimide to form a sulfosuccinimidyl intermediate that is capable of forming an amide bond with the amine group on the nanostructure (claim 14).

Wong et al discloses the quantum dot is ZnS capped CdSe, CdSe or TiO₂ (column 5, lines 64-67 thru column 6, lines 1-9), CdSe core and ZnS shell (front page of patent; Dabbousi et al), oxidizing the ends of the carbon nanotube, placing at least one amine group on the nanostructure, and coupling at least one end of the carbon nanotube with the nanostructure (claim 10), 2-aminoethanethiolhydrochloride (column 8, lines 38) and wherein coupling the end of the carbon nanotube with the nanostructure comprises adding 1-ethyl-3-(3-dimethylaminopropyl) carbodiimide HCL in the presence of N-hydroxysuccinimide to form a sulfosuccinimidyl intermediate that is capable of forming an amide bond with the amine group on the nanostructure (column 8, lines 47-54).

Since Lieber et al and Wong et al are both from the same field of endeavor, the purpose disclosed by Wong et al would have been recognized as the pertinent art of Lieber et al.

It is obvious, at the time the invention was made, for one with ordinary skill in the art, to modify Lieber et al with the teachings of Wong et al, for the purpose of providing a heterostructure which includes a carbon nanotube covalently linked to at least one nanocrystal.

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Claims 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lieber et al (6,743,408 B2) and Wong et al (6,875,274 B2) further in view of Fisher et al (6,203,814 B1).

11. Lieber et al and Wong et al disclose the subject matter of claim 10, which depends from claim 1, however, neither Lieber et al nor Wong et al disclose refluxing the carbon nanotube in an acid (claim 11) and the acid being nitric acid (claim 12).

Fisher et al discloses refluxing the carbon nanotube in an acid (column 12, line 46)) and the acid being nitric acid (column 3, lines 21-22)

Since Lieber et al, Wong et al, and Fisher et al are all from the same field of endeavor, the purpose disclosed by Fisher et al would have been recognized in the pertinent art of Lieber et al and Wong et al.

It is obvious, at the time the invention was made, for one with ordinary skill in the art, to modify Lieber et al and Wong et al with the teachings of Fisher et al, for the purpose of making functionalized nanotubes.

Claims 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lieber et al (6,743,408 B2) in view of Korgel et al (6,846,565 B2).

12. Lieber et al discloses the above claimed subject matter of claim 15, which depends from 1, however, Lieber et al does not disclose the nanodevice being a transistor, a light emitting diode, an inverter, resistor, capacitor interconnect, or biosensor (claim 17).

Korgel et al discloses the nanodevice being a transistor, a light emitting diode, an inverter, resistor, capacitor, interconnect, or biosensor (column 2, lines 66-67 thru column 3, lines 1-5; *transistor, LED, or biological sensor*).

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Since Lieber et al and Korgel et al are both from the same field of endeavor, the purpose disclosed by Korgel et al would have been recognized in the pertinent art of Lieber et al.

It is obvious, at the time the invention was made, for one with ordinary skill in the art, to modify Lieber et al with the teachings of Korgel et al, for the purpose of light emitting nanoparticles.

Conclusion

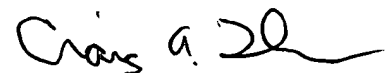
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Monica D. Harrison whose telephone number is 571-272-1959. The examiner can normally be reached on M-F 7:00am-3:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead Jr. can be reached on 571-272-1702. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Monica D. Harrison
AU 2813

mdh
April 13, 2004



CRAIG A. THOMPSON
PRIMARY EXAMINER